Gozo College
Boys' Secondary
Victoria - Gozo, Malta
'Ninu Cremona'

Half-Yearly Examination 2012 – 2013

Subject: **COMPUTING**

Form: **4 – Track 3**

Time: **1 hr 30 min**

NAME: _____

CLASS: _____ **INDEX NO:** _____

Instructions to Candidates

Answer ALL questions in Section A and Section B on this paper.
Calculators are NOT allowed.
Good English and orderly presentation are important.

Item Number	1	2	3	4	5	6	7	8	9	10	11	12	13	Practical	Total
Marks															

Use this margin for rough work only

Section A – Answer ALL questions.

1. An **8-bit register** of a computer system contains the binary number **10011**.

   a. What is a register? [2]

   _____

   _____

   b. What may be done to the bits in the register to quickly **double** (multiply by 2) the value of the number? [1]

   _____

   c. Show how the result of part (b) is stored in the 8-bit register. [1]

   _____

   d. Convert result of part (b) to **decimal**. [1]

   _____

2. Data is represented using the binary number system.

   a. Use **2's complement** arithmetic and an **8-bit register** to work out **120-31**. [3]

   Answer: _____

   b. What situation arises if the result of an addition operation does not fit in a register? [1]

   _____

   c. Which other mathematical function may also result in a similar situation to the one mentioned in question (b)? [1]

   _____

Use this margin for rough work only

3. Two's Complement Binary and Unsigned Binary are two ways how numbers and data can be represented in computing.

   a. What is the **smallest binary number** that can be represented in

      i. a 10-bit two's complement register: _____

      ii. a 6-bit unsigned binary register: _____

   [2]

   b. What is the **largest number** that can be represented in an **8-bit two's complement** register. Give your answer both in **decimal** and **binary**.

      Decimal: _____ Binary: _____

   [1]

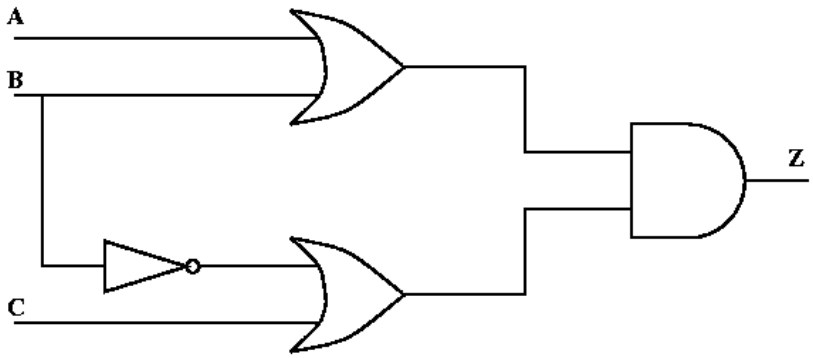
   c. Provide **two reasons** for storing numbers in two's complement and not as unsigned binary numbers.

      1. _____

      2. _____

   [2]

4. Give the **truth table** and **Boolean expression** for the following logic circuit.



Boolean Expression

Answer: _____

[2]

Truth Table

[3]

Use this margin for rough work only

5. A mayor would like to create a **binary code** for every property (house, flat, maisonette) in his town using **7 bits**.

   a. What is the **maximum number of properties** that can be coded using 7 bits? [2]

   _____

   b. He realised that he does not have enough codes and would like to **double the number of codes available**. What can he do to do this? [2]

   _____

   c. The mayor decided to represent the codes in **hexadecimal** instead of binary. **Why** would he do that? [1]

   _____

6. Using JAVA, complete the following code to display the **first 10 multiples** of a number ***num*** entered by the user. (If 4 is entered by the user the multiples 4, 8, 12, 16,…,40 are displayed)

```
class Multiples{
    public static void main (String args[]){
        int num;
```

[5]

7. **Documentation** is a very important aspect of a new computerised system.

   a. What is the **main difference** between the User Manual and the other manuals in terms of the vocabulary used? [1]

   _____

   _____

Use this margin for rough work only

b. Mention **TWO** key items that one would expect to find in the **Technical Documentation**.

_____

_____ [2]

c. Mention **TWO** situations that could arise that would require the use of the **Program Documentation**.

_____ [2]

_____

_____

8. A gate giving access to a car park rises if the **car park is not full** and a **parking ticket is inserted** in the machine.

Let A represent 'car park full'.
Let B represent 'car park ticket inserted'.

Draw the **logic circuit** and **truth table** of the gate's function (G) where 1 = open. [5]

9. Amongst all kinds of programming errors, **logic errors** are said to be the hardest to trace and debug.

a. **Why** are logical errors considered to be the worst? [2]

_____

_____

Use this margin for rough work only

b. Give **one example** of a logical error.

_____ [1]

c. **Name and describe** a tool that programmers use to identify logic errors.

_____

_____ [2]

10. The following is a simple Java class that uses lejos instructions to control a robotic car. The following instructions **move the car forward** and then **turn it 90 degrees to the left**.

```
public class Turn90Degrees{
    public static void main (String args[]){

        LCD.drawString("Move & Turn",0,0);

        Motor.B.regulateSpeed(true);
        Motor.C.regulateSpeed(true);
        Motor.B.setSpeed(300);
        Motor.B.setSpeed(300);

        Motor.B.forward();
        Motor.C.forward();
        Timer.sleep(1000);

        Motor.B.stop();
        Timer.sleep(1000);
        Motor.C.stop();
    }
}
```

a. What is the method that controls the car's speed called? _____ [1]

b. What is the function of the instruction Timer.sleep(1000)?

_____ [2]

_____

c. Write down the instructions you would change from the above code so that your car turns to the right instead of to the left. [2]

_____

_____

_____

Use this margin for rough work only

11. The following is part of a JAVA program that works out the **area of a circle**.

```
System.out.println("Enter radius of circule:");
rad=keyboard.readInt();
area=PI*rad*rad;
```

a. The variables 'rad' and 'area' have to be declared. Write down the **data type** which is suitable for these variables.

Variable: 'rad' Datatype: _____

Variable: 'area' Datatype: _____

[2]

b. Write down the instruction to declare 'PI' as a **constant** equal to 3.142.

[2]

_____

c. Rewrite the instruction where the area is calculated using the **Math class** to work out the square of the radius.

[1]

_____

Section B – Answer BOTH questions.

12. Below is a simple JAVA class that deals with the marks of a group of students.

```
public class Marks{
    public static void main (String args[]){

        int x;
        int mark;
        int tot = 0;                                    //……..1

        for (x = 1; x < 11; x=x+1){
            do{                                         //……..2
                System.out.print("Enter a mark between 0 and 100: ");
                mark = Keyboard.readInt();
            }while (mark<0);
            tot = tot + mark;                           //……..3
        }

        double aver = (double)tot/10;                   //……..4
        System.out.println();
        System.out.println("The total is : " +tot);
        System.out.printf("The average is :%.2f\n",aver);
    }
}
```

Use this margin for rough work only

a. Identify the **TWO loop** constructs that are used in this program.

Loop 1: _____ [2]

Loop 2: _____

b. The user cannot enter a mark which is less than 0. However, the user CAN enter a mark which is greater than 100. Identify the instruction which needs to be modified, and write down a new instruction that you would write instead to make the program reject marks which are greater than 100 or less than 0.

Instruction to be modified: _____ [2]

New instruction: _____

c. Re-write the instructions 'x=x+1' and 'tot=tot+mark' using different arithmetic operators.

x=x+1 : _____ tot=tot+mark : _____ [2]

d. What is type casting?

_____

_____ [2]

Identify an instruction from the program where type casting is taking place:

_____ [1]

e. The last instruction is *System.out.printf("The average is :%.2f\n",aver);*

i. Why was the command 'printf' used instead of 'println'? [3]

_____

ii. What would be the difference if %.2f is replaced by %.4f?

_____

iii. What is the function of \n in this instruction and what is it called?

_____

f. In the above program there are four // followed by dotted lines.

i. What are these four // used for? [1]

_____

Use this margin for rough work only

ii. In the space below write down the appropriate text to replace the dotted lines.

//……..[1] : _____ [2]

//……..[2] : _____

//……..[3] : _____

//……..[4] : _____

13. The **system life cycle** is the process involved in the development of a new computerised system.

a. Write down the following system life cycle stages in order.

programming and documentation, feasibility study, system maintenance, control and review, present system study, implementation and change over, system design [3]

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

b. Provide a **reason** to show why the systems analyst has to undertake each of the following three tasks.

Feasibility study: _____ [2]

_____

_____

Control and review: _____ [2]

_____

_____

Use this margin for rough work only

Present system study: _____

[2]

_____

_____

c. Suggest **two methods** that the system analyst can use to collect the necessary information.

[2]

Method 1: _____

Method 2: _____

d. **Differentiate** between **Parallel** and **Direct** changeover methods stating advantages and disadvantages of each.

_____

[4]

_____

_____

_____